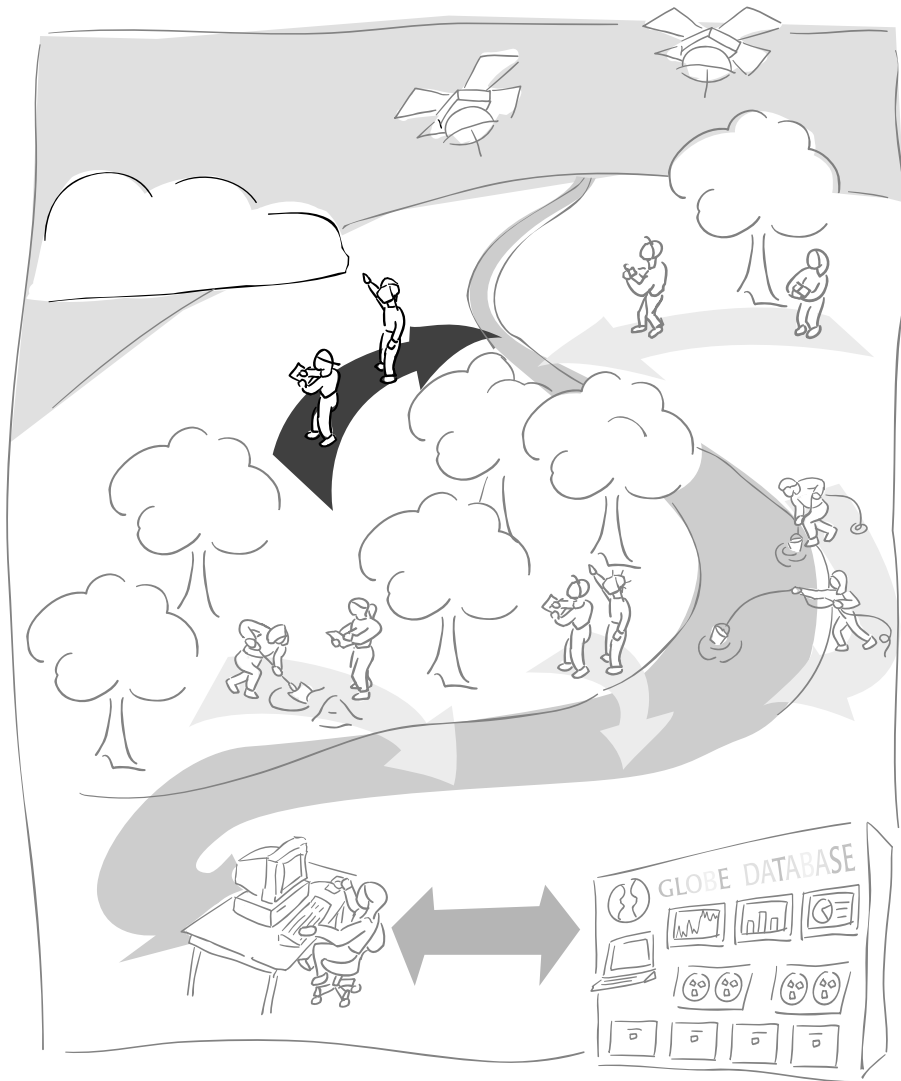


Atmosphere Investigation



A GLOBE® Learning Investigation



Atmosphere Investigation at a Glance



Protocols

Daily measurements within one hour of local solar noon:

precipitation (rain or snow) including precipitation pH
maximum and minimum temperature for the last 24 hours
(if using a Digital Multi-Day Max/Min thermometer this can
be read at anytime of day)

At least one measurement per day:

cloud cover and type and contrail cover and type
aerosols
water vapor
relative humidity
snow pack
current temperature
surface temperature
ozone

Suggested Sequence of Activities

- Read the *Introduction*, especially the sections *What Measurements Are Taken* and *Getting Started*.
- Read the brief description of the learning activities at the beginning of the *Learning Activities* section.
- Review the protocols and plan which measurements your students will take; feel free to start with an easily sustained level of effort and then expand.
- Order any new or replacement instruments required.
- Cloud measurements are the easiest place to start and are required for several other protocols; do these activities with your students before beginning cloud observations:
 - Observing, Describing, and Identifying Clouds*
 - Estimating Cloud Cover: A Simulation*
- Install the instrument shelter which is required for taking air temperature measurements.
- Check the calibrations of your instruments (thermometers and barometer or altimeter).
- Have students define their Atmosphere Study Site and submit site definition data to GLOBE.
- Install your rain gauge and barometer or altimeter and plan out measurement logistics (such as where will required instruments and materials stay, timing and time requirements, etc.).
- Choose which *Atmosphere Data Sheets* your students will use and copy them.
- Copy the *Field Guides* for the protocols your students will follow.
- Teach students how to take the measurements following the *Field Guides*, record their readings on the *Data Sheet(s)*, and report data to GLOBE.
- Transfer to the students as much responsibility as practical for taking measurements and reporting data.
- Have students look at their data and comparable data from other schools.
- Engage students in inquiry and help middle and secondary students conduct student research projects using the *Looking at the Data* sections of the protocols.



Table of Contents



Introduction

| | |
|---------------------------------------|-----------------|
| Why Investigate the Atmosphere? | Introduction 2 |
| The Big Picture | Introduction 3 |
| GLOBE Measurements | Introduction 4 |
| Getting Started | Introduction 10 |



Protocols

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| Instrument Construction, Site Selection, and Set-Up |
| Cloud Protocols |
| Aerosols Protocol |
| Water Vapor Protocol |
| Relative Humidity Protocol |
| Precipitation Protocols |
| Digital Multi-Day Max/Min/Current Air and Soil Temperature Protocol |
| Maximum, Minimum, and Current Air Temperature Protocol |
| Surface Temperature Protocol |
| Ozone Protocol |
| Optional Automated Weather Station Protocols* |
| Optional Barometric Pressure Protocol* |
| Optional Automated Soil and Air Temperature Monitoring Protocol* |
| Optional AWS WeatherNet Protocol* |



Learning Activities

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|---|
| Observing, Describing, and Identifying Clouds |
| Estimating Cloud Cover |
| Cloud Watch |
| Observing Visibility and Sky Color |
| Making a Sundial |
| Calculating Relative Air Mass |
| Studying the Instrument Shelter* |
| Building a Thermometer* |
| Constructing a Model of Parts Per Billion Surface Ozone in the Air* |
| Making a Contour Map* |
| Draw Your Own Data Visualization* |
| Learning to Use Data Visualizations: |
| An Example with Elevation and Temperature* |



* See the full e-guide version of the *Teacher's Guide* available on the GLOBE Web site and CD-ROM.



Appendix

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|---|-------------|
| Site Definition Sheet..... | Appendix 2 |
| Data Sheets | Appendix 3 |
| Clouds 1-Measurement Data Sheet | |
| Clouds 7-Measurement Data Sheet | |
| Integrated 1-Day Data Sheet | |
| Integrated 7-Day Data Sheet | |
| Aerosols Data Sheet | |
| Water Vapor Data Sheet | |
| Digital Max/Min Thermometer Calibration and Reset Data Sheet | |
| Digital Multi-Day Max/Min Data Sheet | |
| Surface Temperature Data Sheet | |
| Ozone Data Sheet | |
| Observing Cloud Type | Appendix 27 |
| Glossary | Appendix 33 |